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1. AGENCY USE ONLY (Leave mans) 1. REPORT DATE 1. REPORT TY	ine 83 - June 84
Neuronal Mechanisms of Intelligence.	AFOSR-83-0321
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US Air Force.	
1. SUPPLEMENTARY NOTES 22. DISTREMENTON / AVAILABILITY STATEMENT	12b. DISTRIBUTION CODE
Approved for public release; distribution unlimited.	
The equipment purchased on this grant is being used control, data collection and data analysis on studie by mammalian brain cells during conditioned behaviors DTIC FLECTE JUL 2 4 1990	es of the adaptive rules use
4. SUALECT TERMS	15. NUMBER OF PAGES
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1. Equipment acquired.

The following list describes all equipment actually acquired by name, manufacturer, and cost. The purchased equipment was identical to that requested in our final revised equipment list dated 7 July 1983 except for the Data Plotting System. An alternative system with greater capability and similar price was substituted for the requested Tektronix System because the vendor was unable to provide the necessary software.

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	Grant Expenditure	\$116,966
Approved for public release; distribution unlimated.	Cost Sharing	(\$30,009)
	Total Expense	\$146,975
Rack Mount Equipment Cabinets (4)	Zack Electronics	3,302
Micropipette Puller	Frederick Haer & Co.	3,597
Mettler Balance w/printer (AE163/GA24)	VWR	3,631
Fixed Stage Microscope (Leitz Laborlux 12-FS)	McBain Instruments, Inc.	7,897
Tape Recorder (PR260)	Ampex Corp.	10,070
Isolation Table (GS-34-ST)	Newport Corp.	2,954
Data Plotting System (IBM-XT/HP7475)	Computerland/GTCO	12,408
Storage Oscilloscope (R5113)	Tektronix, Inc.	8,980
Storage Oscilloscope (R5223)	Tektronix, Inc.	10,848
Dissecting Microscope (Wild M5APO)	McBain Instruments, Inc.	7,092
Micromanipulators (2-Leitz)	McBain Instruments, Inc.	12,085
Dual Microdrive System (2-Inchworm)	Burleigh Instruments, Inc.	8,555
Signal Discriminator System	Frederick Haer & Co.	5,318
Computer Control System Components	Data General Corp.	36,281
Iontophoresis & Pressure Injection System	Medical Systems Corp.	8,046
Extracellular Preamplifiers (2-#2400)	Dagan Corp.	5,911
Item Purchased	<u>Manufacturer</u>	Cost+

⁺Including tax and shipping.

2. Eq. pment usage.

All equipment has been used for on-line experimental control, data collection, and data analysis functions of our AFOSR-sponsored research entitled "Neuronal Mechanisms of Intelligence" (AFOSR Contract F49620-81-K-0015; AFOSR Grant 84-0325). In this work, we are investigating the adaptive rules used by mammalian brain cells in the mediation of intelligent behavior. The research is based on the assumption that human intelligence has evolved from the goal-seeking brain functions of lower forms, and that these functions in turn depend on a capacity for behavior to be strengthened or rewarded by its consequences (positive reinforcement). We furthermore assume that positive reinforcement of the intact organism is physiologically mediated at the level of the single neuron, rather than at the level of the multi-neuronal assembly or network. The equipment is being used in the performance of experiments designed to investigate whether individual cellular activity can be reinforced by locally applied electrical or chemical stimulation, and, if so, to establish the physiological and biochemical properties of such cellular reinforcement. Experiments are being conducted on single neurons in cell culture, brain tissue slices, and intact brain. The instrumentation permits recording of electrical activity of preselected neurons and reinforcement of particular activity patterns within precise temporal parameters by microinjection of neurotransmitters or drugs, or by electrical stimulation of afferent pathways. Cellular activity is monitored continuously and reinforcement-induced changes are assessed. To date, we have demonstrated operant conditioning of hippocampal CA1 cells using local dopamine injections as reinforcement, and operant conditioning of nucleus accumbens cells using electrical stimulation of dopamine projections as reinforcement.

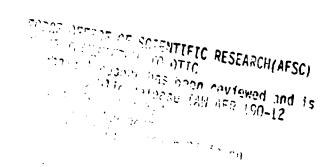
3. Personnel

Following is a list of all personnel who have used the equipment:

Larry Stein, Ph.D. James Belluzzi, Ph.D. Alan Fairhurst, Ph.D. Charles Gorenstein, Ph.D. Andrej Rotter, Ph.D. David Gilbert, Ph.D. Joel Black Keith Truiillo Karen Stevens Eve Chan, M.S. George Stupecky Patricia Calahan Bela Peller Sharon Travers Jim Johnston Ajinder Chhabra Paul Jaruszewski Peter Ngai

Co-PI Professor Assistant Professor Assistant Professor Postdoctoral Student Graduate Student Graduate Student Graduate Student Technician Technician Technician Technician Student Student Student Student Student

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